Jack Micher

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CS/IT 200

Lab 7 Explanation

In lab 7 I used a 1999 length hashmap for each of the collision functions.

Based on the data in the number of probes vs load factor graph:

* **Single Probe**The single probe collision method does not probe more than once per insertion until it reaches 55% load factor, where the data has showed it has probed more than once in an insertion between 50% and 55%. The amount of probes for every 5% of load factor after 55% is around 200 extra probes needed. When the load factor hit 95% the amount of probes needed went up dramatically, by almost 3500 from 90% to 95%. When approaching 100% load it took a total of 16182 probes. This collision function seems to be fairly effective when the size of the load factor is around 50%-55% or below. Even above 55% and below 90% the probing collision function still probes nearly 200 times for every 5%, which averages around 2-3 probes per insertion.
* **Double Hashing**The double hashing collision method does not probe more than once per insertion until it reaches 75%. After 75% the amount of probes needed to insert per 5% increase at a faster, more exponential rate than the Single Probe function. At 100% the total amount of probes was 14845. The double hash collision function seems to be effective at load factor 75% and below, and has less total probes than the single probe collision function. The amount of probes in double hashing start to ramp up after 75% however.
* **Quadratic Hashing**The quadratic hashing collision method starts to probe more than once per insertion at 30%. After 30% the amount of probes needed every 5% gradually increases until reaching 95%. At 95% to 100% the Quadratic function normally likes to infinitely loop as the quadratic function will cause it to miss empty indexes after a certain point. However I was fortunate enough to get a completely full hash map at 13017 probes with the quadratic function. The amount of probes per 5% and chance to infinitely loop keeps this function’s effectiveness to smaller load factors. If there was a way to prevent the infinite loop, this function would technically be the most effective up to 100%, due to the total amount of probes being less than both of the other collision functions.